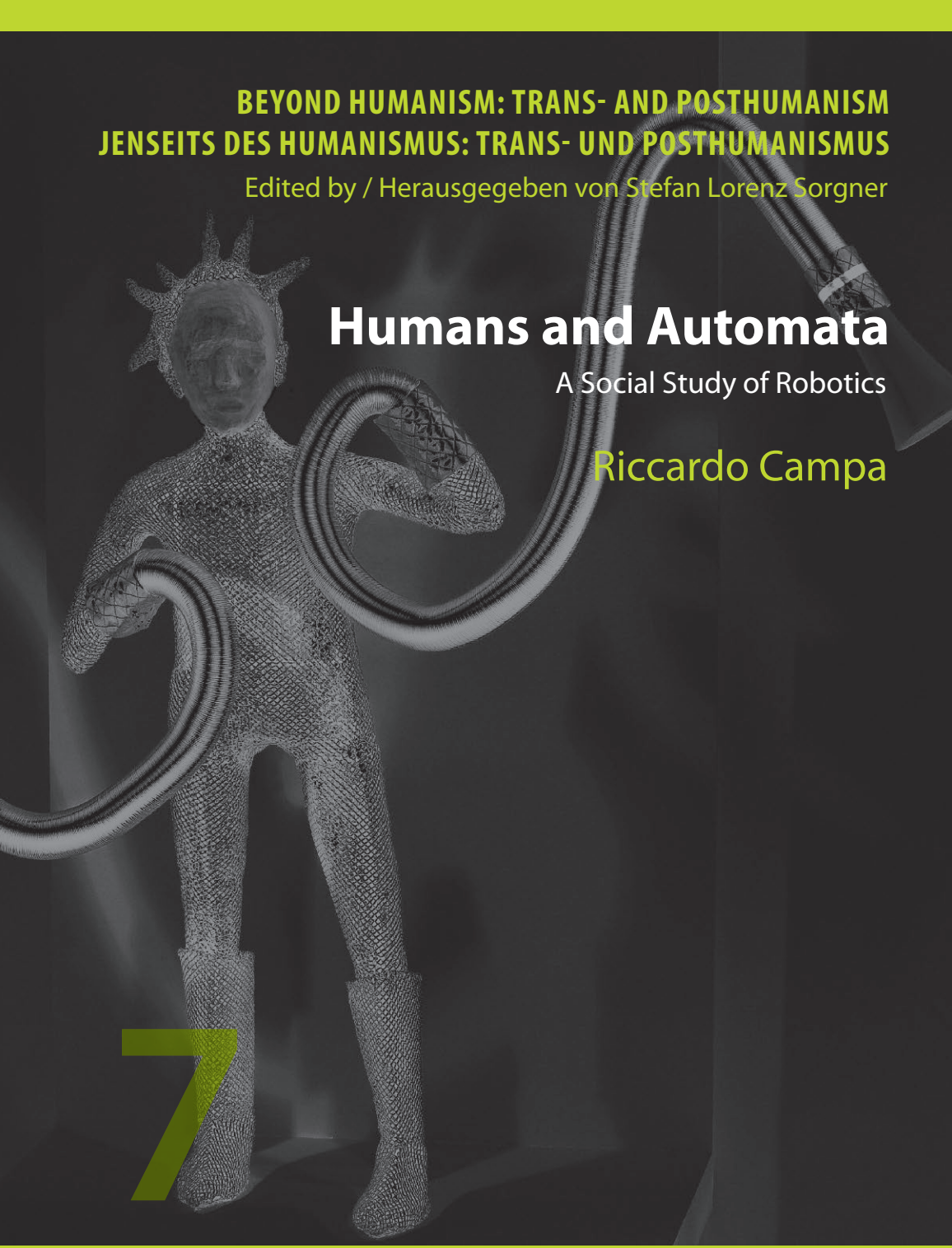
BEYOND HUMANISM: TRANS- AND POSTHUMANISM
JENSEITS DES HUMANISMUS: TRANS- UND POSTHUMANISMUS

Edited by / Herausgegeben von Stefan Lorenz Sorgner

Humans and Automata

A Social Study of Robotics

Riccardo Campa



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The book takes a close look at the social dimensions of robotics. It examines some of the projects on which robotic engineers are presently working, explores the dreams and hopes connected with these undertakings and determines if there is a relation between automation and unemployment within the socio-economic system. Furthermore, it explores the possible futures generated by the development of artificial intelligence and outlines the core ideas of roboethics. Last not least, it examines the systems of military robots, with special emphasis on the ethical issues raised by the design, construction and utilization of these systems of weaponry.

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At bottom, robotics is about us. It is the discipline of emulating our lives, of wondering how we work.
Rod Grupen

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Preface

This book, as its title should quite clearly comunicate, is not on robotics as such, but rather on the social dimensions of robotics. So, let us start from a question: given that the author of this book is a sociologist, why is the research named 'a social study,' and not 'a sociological study,' of robotics? The main reason is that I explore different aspects of robotics, more specifically, the historical, economic, ethical, political, and futurological ones. The adjective that could possibly include all these aspects is 'social.' If sociology were the superscience originally intended by its founders in the 19th century (especially Comte and Spencer), we could still call this research a 'sociological study.' However, subsequently, sociology has strictly defined its object of study and research techniques, differentiating itself from other social sciences or disciplines such as history, economics, ethics, politics, and future studies.

The change in scope that characterizes the shift from classic to contemporary sociology has already been noticed by Florian Znaniecki (1934: v-iv) in his book *The Method of Sociology*. Znaniecki writes: "Now, sociology is passing through a crisis as deep as any science ever passed through. It was established as a synthetic science of 'society' or 'civilization,' using the results of several other sciences to draw such comprehensive generalizations as none of those sciences could or cared to draw for itself. It is changing into an analytic science investigating directly and independently particular empirical data, formulating its own results in a vast monographic literature, and not only avoiding hasty conclusions, but often mistrusting generalization more than other sciences do, and more than is good for any science."

Moreover, Max Weber notoriously proposed a rigid distinction between explanatory theories and normative theories, making of only the first the goal of sociology. This has been remarked, for instance, by the *Oxford Dictionary of Sociology*, which defines 'normative theories' as "hypotheses or other statements about what is right and wrong, desirable or undesirable, just or unjust in society," and points out that "the majority of sociologists consider it illegitimate to move from explanation to evaluation. In their view, sociology should strive to be value-free, objective, or at least to avoid making explicit value-judgements. This is because, according to the most popular philosophies of the social sciences, conflicts over values cannot be settled factually. Moral pronouncements cannot be objectively shown to be true or false, since value-judgements are subjective preferences, outside the realm of rational inquiry" (Marshall 2003).

Sometimes, this position has been taken too far, failing to recognize that Max Weber (2008, 46–7) was mainly talking about being neutral while teaching in the classroom – that is, avoiding behaving as a guru inside the walls of academy. To act as such a guru would have been 'unfair,' because students were asked to be passive listeners. Therefore, shifting from the objective ground of fact-statements to the subjective field of value-judgements could result in a kind of moral 'violence.' However, Weber openly stated that outside the classroom – i.e. in public conferences or in books – a social scientist could also engage in discussions about "what to do," and not only "what is or is not."

It is true that social science is different from social policy from a logical and methodological point of view, but it is also quite clear that the one needs the other. Applied sociology needs theoretical sociology, as robotic engineering needs theoretical physics. Contrarily to what most people assume, robotic engineering – as any type of engineering – is not value-free. It is value-laden no less than social policy or applied sociology, because it changes the world and the lifestyle of people, and very often it does it in a more radical way than social policies. One can argue, however, that social scientists tend to be more conscious than engineers about the political implications and the social consequences of their applications.

The main task of a sociologist is to reconstruct facts and unveil hidden mechanisms that establish a causal relation between certain actions and certain consequences. A sociologist does not venture into statements as to what humans ought to do on the basis of an ethical code or a political doctrine. If (s)he did, (s)he would be a moralist or a politician. Nevertheless – and this is what sociotechnology or social engineering consists of – a sociologist can still evaluate the lines of action from a chiefly technical point of view. For example, (s)he can say if the means M, adopted by agent A, in order to reach the objectives O1, O2, O3…On, is adequate or not in the light of the situation S in which the agent has to make a decision. In this case the evaluation is technical, not moral, because it is concerned with the means, not the ends. An Italian proverb speaks to this tense between the analyses of means and ends: "Non puoi avere la botte piena e la moglie ubriaca" ("one cannot have a full bottle and a drunk wife"). The sociologist will not tell a married man that he should give his wife a bottle of champagne, or that he would do better to save the money. But (s)he may be able to evaluate the efficiency of this man's strategies, whatever these may be, based on the observation that one cannot have a full bottle and a drunk wife. This is also what the physicist does when (s)he uses knowledge to modify reality, by elaborating theories that will be useful to build machines. In this case we call him an engineer, and certainly not a moralist, even if what he does has profound consequences on the life of a lot of people.

In spite of the fact that – given a certain definition of sociology – this work could be categorized as sociological, I decided to opt for a different title in order to avoid the endless epistemological and methodological discussions that surround sociology. We are not here to decide what sociology is or is not, what it should be or should not be, or if sociology is a real science or not. Labelling this work a "sociological study" could divert the attention from the real focus of this book: robots and their interactions with humans. Besides, I am comforted by the fact that interdisciplinary "social studies of science and technology" have already an established tradition inside the academic world.

This book has been composed by assembling and organizing essays and articles already published in English or Italian in scientific and academic journals. That is why the reader may find some concepts to be repeated in different parts of the book. This was a conscious decision made while compiling the various essays and articles, as each chapter is intended to be autonomous, with its own narrative structure. If concepts are repeated in different contexts that means that they are important within the given discussion and will helpful for the reader. This does not mean that those articles and fragments already published were left untouched. Robotics is rapidly evolving, therefore articles published two or three years ago often needed a 'face-lift,' that would take into account new direct observations or more recent secondary literature on the topic.

Chapter 1 is entitled "Engineers and Automata."[1] Its purpose is to examine some of the projects on which robotic engineers are presently working, and to explore the dreams and hopes connected with these undertakings. Here I offer some general information about robots and their origins, some technical information about the difference between the top-down and the bottom-up approaches to robotics, and I show how robotic engineers are incorporating a social understanding of robots. Finally, I explore the most recent literature on social robotics and argue that this interdiscipline is evolving in a direction that will soon require a systematic collaboration between engineers and social scientists.

Chapter 2 is entitled "Workers and Automata."[2] Its aim is to determine if there is a relation between automation and unemployment within the Italian socio-economic system. Technological unemployment is a long time debated problem.

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1 Originally published in Italian as "Nascita e sviluppo della robotica" (Campa 2011, section 1.1.), with the exclusion of the section "The Rise of Social Robots," which is still unpublished.

2 Originally published in *Journal of Evolution and Technology* as "Workers and Automata. A Sociological Analysis of the Italian Case" (Campa 2014a).

One possible definition of technological unemployment is "unemployment due to our discovery of means of economising the use of labour outrunning the pace at which we can find new uses for labour" (Keynes 1930). The discussion about this phenomenon goes back at least to the beginning of the industrial revolution and the birth of Classical political economy.[3]

In Europe Italy has the second highest rate of robot density and the fourth highest rate in the world. Among the G7 it is the nation with the highest rate of youth unemployment. Establishing the ultimate causes of unemployment is a very difficult task, and the notion itself of 'technological unemployment' is controversial. Mainstream economics tends to relate the high rate of unemployment that characterizes Italian society with the low flexibility of the labour market and the high cost of manpower. Little attention is paid to the impact of artificial intelligence on rates of employment. With reference to statistical data, we will try to show that automation can be seen at least as a contributory cause of unemployment. In addition, we will argue that both Luddism and anti-Luddism are two faces of the same coin. In both cases attention is focused on technology itself (the means of production) instead of on the system (the mode of production). Banning robots or denying the problems of robotization are not effective solutions. A better approach would consist in combining growing automation with a more rational redistribution of income.

---

3 One of the first scholars to study systematically technological unemployment was David Ricardo. Initially, Ricardo denies the problem. He maintains that the introduction of machinery is beneficial to all classes of society. He formulates what has been defined as "the first satisfactory statement of the theory of 'automatic compensation'" (Blaug 1958, 66). Other thinkers (among them: Say, Sismondi, and Malthus) oppose this view. Subsequently, "Ricardo retracted his former opinion on the subject" (Kurz 1984), shocking his own followers. Indeed, the idea "that the substitution of machinery for human labour, is often very injurious to the interests of the class of labourers" can be found in chapter XXXI, "On Machinery," in the third edition of Ricardo's *Principles*, published in 1821 (Ricardo 2004). This way, the idea of technological unemployment "marks its first appearance in respectable economic literature" (Kurz 1984; see also Lowe 1976, 250). As a matter of fact, the Luddites were denouncing this problem since long time, but only with Ricardo's classical economy, technological unemployment enters the 'world of ideas.' Karl Marx has also noticed that machinery did not free humans from labour, but rather caused unemployment on the one hand and the inhumane exploitation of those still employed on the other hand. Quite significantly, Marx praises Ricardo's "scientific impartiality and love of truth" (Marx 1976, 565). Similarly, Lowe (1954, 142) will characterize the chapter "On Machinery" by Ricardo as "a rare case of self-destructive intellectual honesty."

Chapter 3 is entitled "Citizens and Automata."[4] The aim of this chapter is to explore the possible futures generated by the development of artificial intelligence. Our focus will be on the social consequences of automation and robotization, with special attention being paid to the problem of unemployment. In spite of the fact that this investigation is mainly speculative in character, we will try to develop our analysis in a methodologically sound way. To start, we will make clear that the relation between technology and structural unemployment is still controversial. Therefore, the hypothetical character of this relation must be fully recognized.[5] Secondly, as proper scenario analysis requires, we will not limit ourselves to predict a unique future, but we will extrapolate from present data at least four different possible developments: 1) unplanned end of work scenario; 2) planned end of robots scenario; 3) unplanned end of robots scenario, and 4) planned end of work scenario. Finally, we will relate the possible developments not just to observed trends but also to social and industrial policies presently at work in our society, which may change the course of these trends.

Chapter 4 is entitled "Roboethicists and Automata."[6] Here we attempt to outline the core ideas of roboethics, that is, of ethical analysis as applied to robotics. First of all, we make some general remarks about the purpose and origins of this field, after which we move on to the normative aspects. We then define our ethical perspective as a whole and propose a 'rational' and 'pragmatic' approach to moral problems. Briefly, this approach consists in positing the 'good,' as understood as 'happiness,' as the fundamental value of ethics (in agreement with the Greek philosophical tradition), then rationally working out the behavioural norms that ought to lead to this 'good' and, finally, empirically and pragmatically assessing if respecting these norms *de facto* allows us to attain this end. If this is not the case it will be necessary to rationally reformulate the norms. We will then explore the main points of two well-known codes of roboethics: Asimov's "Three Laws of Robotics" and the "Euron Code." We have established that, given our rational and pragmatic standpoint, the Euron Code is the most suitable code for the regulation of military robotics. Essentially it boils down to five basic recommendations: *Safety* (control by humans); *Security* (preventing illegal use); *Privacy*

4 Originally published in *Journal of Evolution and Technology* as "Technological Growth and Unemployment: A Global Scenario Analysis" (Campa 2014b).

5 Indeed, a variety of factors have been indicated as determinants of unemployment (Gangl 2003, Malinvaud 1994, Reutter 2001, Rubart 2007, Sonnenberg 2014, Howell 2005, Stockhammer 2004, Gordon 2004, Groot 2004, Giugni 2009, Werding 2006, Salvadori & Balducci 2005, Ostrup 2003, Vroman & Brusentsev 2005, Hughes 2014).

6 Originally published in Italian as "Principi di roboetica" (Campa 2011, chapter 2).

(protection of data collected by the robot); *Traceability* (recording every activity carried out by the robot); and *Identifiability* (attribution of a secure and registered identity to every single robot). These recommendations are still compatible with a belligerent use of suitably regulated robots. On the contrary, Asimov's laws simply reject the possibility of using robots in warfare: indeed the first law states that "A robot may not injure a human being or, through inaction, allow a human being to come to harm" (without distinction between friends and enemies). Finally we tackle the legal mess arising from the problem of the juridical responsibility of robot behaviour, which can be fall under many subjects: the designer, the builder, the owner, the user, and – in an evolutionist perspective – the robot itself.

Chapter 5 is entitled "Soldiers and Automata."[7] The purpose of this chapter is to examine systems of military robots (or robotized weapons), with special emphasis on the ethical issues already raised by the design, construction and utilization of these technological objects, as well as on the possible future development of these systems of weaponry and of the new ethical problems they lead to. We will explore the field of military robotics in more detail, along the way pointing out the features of the models of robotic weapons currently in use on the battle field or in the stage of prototypes. We will give particular attention to the function of these machines and to the specific needs expressed by the soldiers using them. Our information comes from newspaper articles, books and documents compiled by military authorities. The *Unmanned System Roadmap* published by the United States Department of Defense stands out for its informative and futurological perspective, and is therefore particularly useful.

Then, we proceed by examining ethical problems of military roboethics. We go into further detail and apply the ethical norms that we worked out and discussed in chapter four to the robotized weapons presented and analysed in the first part of chapter five. Initially we reconstruct the main objections advanced by experts against a belligerent use of robots. First of all we outline Noal Sharkey's plea for an international moratorium, which has been echoed in the press. Then we take a look at the worries, expounded by some thinkers, that robots belong neither to the category of inanimate objects nor to that of sentient beings, and that there could therefore be war crimes without war criminals. Finally we analyse a number of current and hypothetical problems expounded by Peter W. Singer. Among these are a) the trivialization of war due to remotely piloted "Unmanned Aircraft Systems" (such as the "Predator"); b) the rise of "war porn" because robotic weapons

7 Originally published in Italian as "La robotica militare," "Problemi etici della robotica militare," and "Uno sguardo al futuro" (Campa 2011, section 1.2, chapters 3 and 4).

record war action, with the footage ending up online and thereby whetting sick voyeurism in the viewers; c) the possible multiplication of conflicts because of the indifference of ordinary people who will no longer have to give their lives, no longer be subjected to rationing, no longer pay war tax, no longer be called to vote for war intervention.

Once we have highlighted these various problems we come to the defence of our own standpoint. So, in the last pages of the book we will openly shift from an analytical-descriptive perspective to an axiological-normative one. Regarding the many proposals to ban or imposing moratoriums on military robots, among which Sharkey's is just the most well known, we observe that these suggestions are unrealistic and impracticable. Indeed the arms race is a typical case of the game theory known as "the prisoner's dilemma." Even if one could rationally argue in favour of the adoption by the various manufacturers of a very restrictive precautionary principle, the effective lack of mutual trust between nation states will induce them to go for the option that carries least individual (and not global) risk: namely, the construction of ever more powerful robotic weapons. In my humble opinion, it is less unrealistic – and certainly more advisable – to initiate negotiations that purport not so much to block the research and development of military robots, but to regulate their actual use on the battlefield. This sort of convention has already been agreed upon and respected in the case of other systems of weaponry. This suggests that this approach is more practicable. In addition it is certainly possible to lay down strict rules relative to the identification and the traceability of the robots that give exact information regarding to whom they belong, whose responsibility they are, where they are located, what they are doing and what they have done. This ought to limit the damage due to the possible illegal use of these weapons by organized criminals or terrorist groups.

As regards voyeurism and "war porn," we will see that new technologies amplify these problems, but do not cause them. Anthropology teaches us that man is no angel, but a morally ambivalent being: on the one hand he is capable of remorse, compassion, altruism, but on the other he still remains the most ruthless predator to have appeared on planet Earth. In particular, unlike many other predators, he has proven able to kill for sheer pleasure or in revenge. Nevertheless it is precisely man's ambivalent nature that should induce us to also consider the possibility that the footages of robot soldiers might act as an antidote to the multiplication of conflicts, sensitising public opinion, and causing improper use to stir indignation.

The fact that man is by definition no angel should make us view the question of "control" by humans in a different light. This first point of the Euron Code is indeed the one that seems to require the most critical thinking if it is to serve as a

source of efficient implemental norms. The dogma of "human control" risks becoming an obstacle, unless one takes two fundamental questions into account: 1) it is necessary to clarify what one means by "human control" (remote control? A veto on certain actions? The ability to incapacitate the robot at any time? The ability to switch it off given to any human being or only to the legitimate owner, to the manufacturers, to the users, to agencies of law enforcement?); 2) it is always necessary to keep in mind that mobsters and terrorists are *humans* and may gain *control* over such technology.

To sum up, we propose a different approach, one that is statistical and pragmatic. Given that human beings make mistakes (via inexperience, friendly fire, cruelty, pointless violence, torture, etc.), and given that even in war "control by humans" might become impracticable (maximum robot autonomy might confer military superiority over the adversary), it is better to avoid fixating on this principle. I think that it is more rational to allow machines increasing room for autonomy and use statistics to evaluate whether they commit more or fewer mistakes than humans. This will allow for the development of more sophisticated prototypes and for the further development of functional autonomy.

Finally, we will venture into futurology, and try to imagine forms and functions of future robots, with a particular attention to possible military use. We will examine the reasons that make us believe where we are heading. Basic reasons are the optimal performance of current robots, the increasing faith of the army in these machines and the requirements of its commanders (that the Department of Defense promptly transmits to designers and manufacturers). The synergy between the army, politicians and the private manufacturing sector suggests that this trend is unlikely to change. It may, however, possibly slow down because of unforeseen developments (the financial crisis, the withdrawal from Iraq, etc.). The two main innovations of the future will be the miniaturization of 'unmanned systems,' linked to the development of nanotechnology, and the emergence of robots with ever more human-like shapes and behaviours, the so-called 'androids.' These technologies – anticipated by scientists, futurists and writers of science fiction – will bring about hitherto unseen opportunities and dangers.

We will also examine a series of reasons why the robotic arms race is unlikely to end in the extinction of the human race (as predicted by works of science fiction like *The Terminator* or *The Matrix* or insome recent newspaper articles). However, while the apocalyptic outcome may be improbable, it is certainly not impossible. Faced with this uncertainty, in order to ethically justify the choice of going ahead with the further development of this technology, we will rely on the logical insufficiency of the precautionary principle, which does not give enough credit to all the benefits that may come from the development of robotics. In addition, I will

make a recommendation that can be summed up as follows: it is not advantageous to halt technological progress, including that of military robots, but it is rational to develop lines of parallel research, the goal of which is to design technologies that will be able to counterbalance those harmful outcomes. To put it as a slogan: *any drug can become a poison, therefore every poison needs to have its antidote.*

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Last, but not least, I thank my little son Leonardo for his spontaneous and contagious fascination with robots and machinery, and for his many questions about the future that he will inhabit.

I dedicate this book to the memory of my master and teacher Robert K. Merton (1910–2003) sociologist, methodologist, historian of ideas, and outstanding student of science, technology and society.

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